

QUATECH

QSP-200/300

Four Channel Asynchronous
RS-422/485 PCMCIA Adapter

INTERFACE CARDS FOR PERSONAL COMPUTERS

User's Manual

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(EN55022, EN60555-2, EN60555-3)
- EN50082-1
(IEC 801-2, IEC 801-3, IEC 801-4)

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Equipment Class: Commercial, Residential, & Light Industrial

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1 Introduction

The Quatech QSP-200/300 provides four independent RS-422/485 asynchronous serial communications interfaces for systems equipped with PCMCIA Type II and/or Type III expansion sockets. The QSP-200/300 is a PCMCIA Type II (5 mm) card and is PCMCIA PC Card Standard Specification 2.1 compliant.

The QSP-200/300's serial ports are implemented using 16C550 Universal Asynchronous Receiver/Transmitters (UARTs) which are the recommended communications interface for multitasking environments and with applications involving high data transfer rates.

The QSP-200/300's four serial ports are addressed in a single 32 byte I/O block for simplified programming and all four channels share a common interrupt (IRQ). A special interrupt status register is also available to simplify the software required to service multiple serial ports in an interrupt driven environments.

2 Windows 95/98/ME/2000/NT Installation

Windows 95/98 maintains a registry of all known hardware installed within the computer. Inside this hardware registry Windows 95/98 keeps track of all the computer's resources, such as base I/O addresses, IRQ levels, and DMA channels. In the case of a PC Card (PCMCIA) type board, Windows 95/98 configures the new hardware using free resources it finds within the hardware registry, and updates the registry automatically.

Windows 95/98 handles the QSP-200/300 as a "parent/child device". The QSP-200/300 is the "parent device". Each serial port is a "child device" of this "parent device". To allow easy configuration of Quatech's QSP-200/300, two configuration files have been written. These files are called "**INF**" files. The "**QSP-200.INF**" file describes the resources of the QSP-200/300 parent device and indicates the number of child devices. There are 4 child COM ports for the QSP-200/300. The "**MLTPT_SP.INF**" file describes the settings for each serial port including all the necessary device drivers.

Windows 95/98 allows changes in the system resources if the default choices are unacceptable. But first, allow Windows 95/98 to configure all of the devices. Since the child COM ports are dependent on the parent devices resource allocations, the resources can only be modified at the parent device. Changing these resources is an easy task described in a later section.

2.1 Installing a Quatech QSP-200/300 Under Windows 95/98/ME/2000

2.1.1 Windows 95/98

1. Insert the QSP-200/300 into any available PC Card socket.
2. The first time a new PC Card is installed the **Add New Hardware Wizard** window opens. After the first installation, Windows 95/98 will automatically detect and configure the card. If the **Add New Hardware Wizard** window does not open, then skip to the next section, "Viewing the QSP-200/300 Settings".
3. The **Add New Hardware Wizard** window provides several options to configure the QSP-200/300 card. Click the "**Driver from Disk**" option button. Click "OK" to continue.
4. Insert the QSP-200/300 Quatech COM CD into the drive, select the correct drive letter, and click "OK". Windows 95/98 will browse for the aforementioned files.
5. During the installation process, it may be required to supply the computer with the Windows 95/98 CD. Insert the CD when prompted and click "OK"

IMPORTANT NOTE:

If the user has previously used any of the PC's COM ports and the Windows 95/98 installation CD is not available, the user may be able to skip this step. When prompted for the Windows installation CD, click the "Skip" button to abort copying of the serial communication drivers. If these drivers are already present on the PC, the currently installed drivers will be used.

6. The QSP-200/300 PC Card should now be configured. In the future, Windows 95/98 will automatically recognize and configure the QSP-200/300.

2.1.2 Window Millennium (ME)

1. Insert Quatech COM driver CD into the CD-ROM
2. Insert the QSP-200/300 into any available PC Card socket.
3. The '**Add New Hardware Wizard**' will open. Select '**Automatic search for a better driver**'

Windows Millennium will automatically search and install the correct driver for this device.

2.1.3 Windows 2000

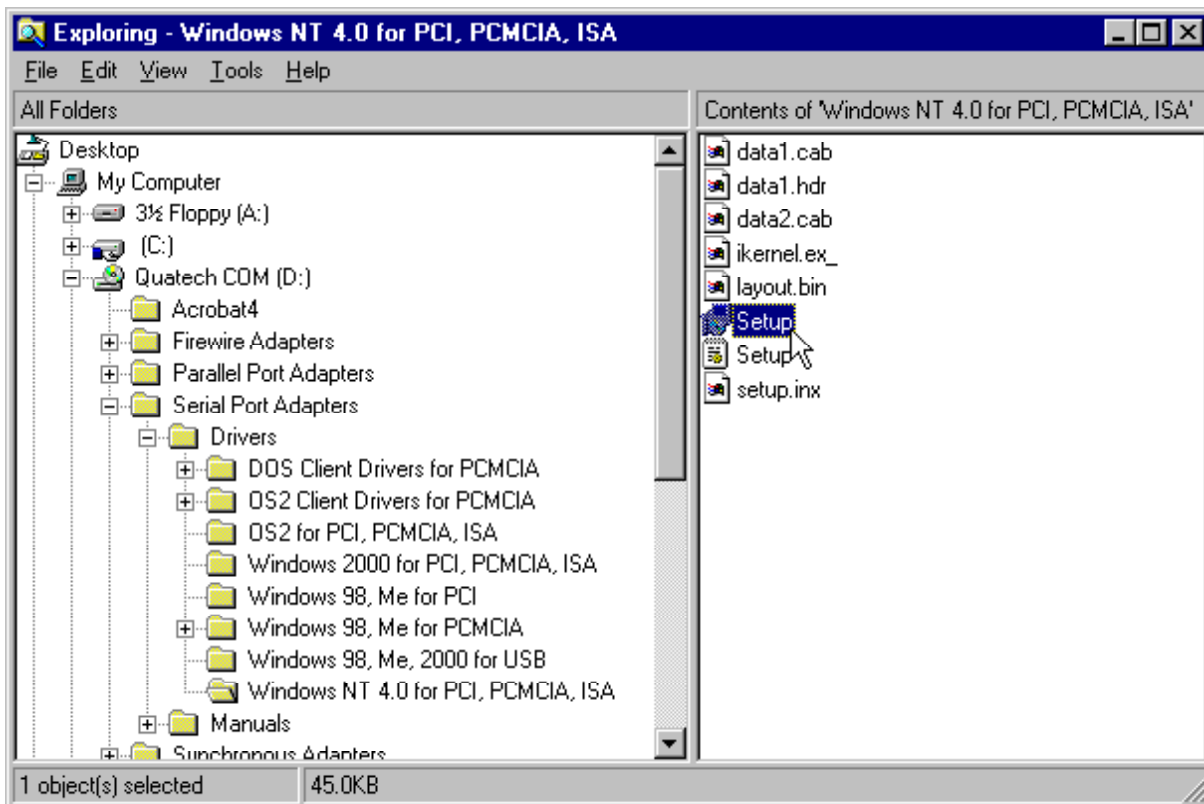
1. Insert Quatech COM driver CD into the CD-ROM

2. Insert the QSP-200/300 into any available PC Card socket.
Windows 2000 will automatically install the driver for this device.

2.1.1 Installing QSP-200/300 Under Windows NT

To allow easy configuration of the QSP-200/300 the Quatech Device Manager for Windows NT has been written for the hardware. This configuration utility supports the QSP-200/300 only in block addressing mode.

To begin the installation, open Windows Explorer and search for the 'Setup.exe' command to install the Quatech Device Manager. <See following Windows Explorer figure.> (D:\Serial Port Adapters\Drivers\Windows NT 4.0 for PCI, PCMCIA,ISA). Once the installation is complete an icon will be placed on the desktop.



Windows NT Explorer

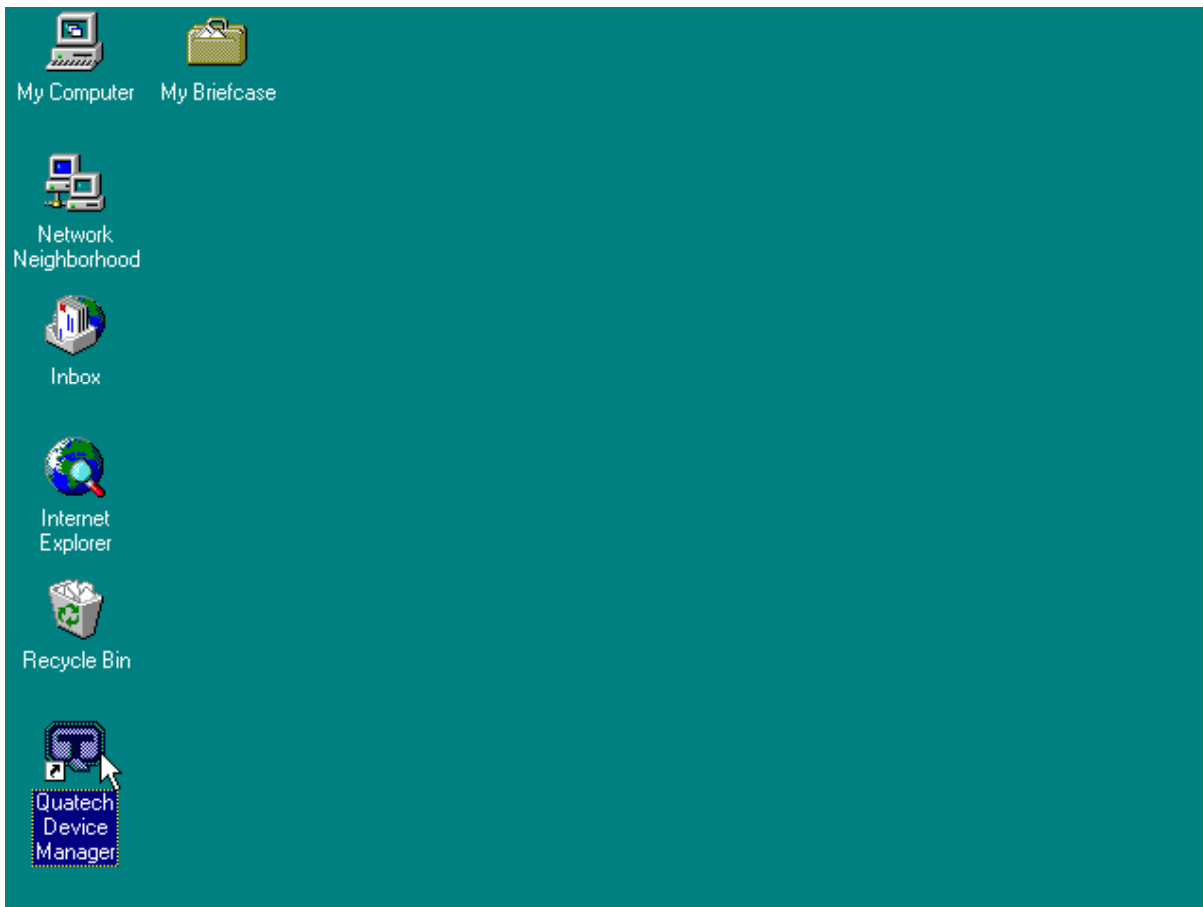
1. Locate and double click the Quatech Device Manager icon on the desktop.

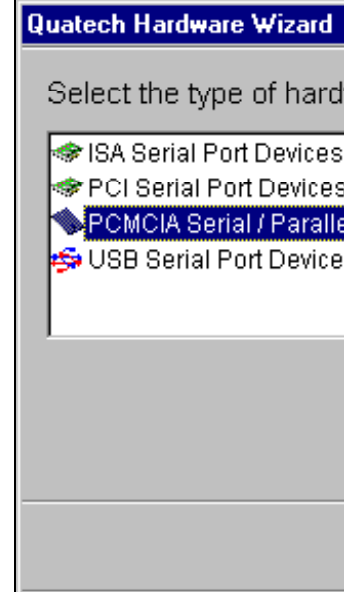
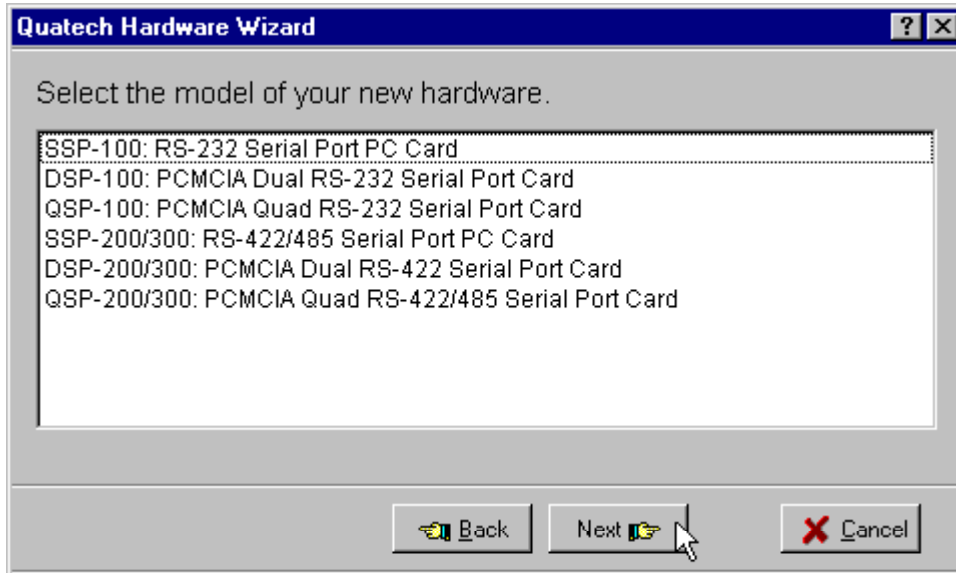
Device Manager Icon on Desktop

2. Click the 'Add' button at the bottom of the Quatech Device Manager Window.



3. Follow the steps for the 'Add Quatech Hardware Wizard'.





4. Complete the final steps of the installation, insert the PCMCIA Card and re-boot the computer.

- Additional help is available online

The QSP-200/300 PC Card should now be configured. In the future, Windows NT will automatically recognize and configure the QSP-200/300.

Note: Windows NT does not support 'Plug and Play' for PCMCIA cards. The PCMCIA Card must be inserted prior to starting Windows NT and can not be removed and reinserted while Windows NT is running.

Viewing the QSP-200/300 Resource Settings

The following steps detail how to view the resource settings that Windows 95/98/ME/2000 has allocated for the QSP-200/300.

2.1.4 Window 95/98/ME

1. Double click on the **My Computer** icon located on the Windows 95/98 desktop. This opens a folder showing various drives, Control Panel, etc.
2. Double click on the **Control Panel** icon. This opens another folder with many different system utilities.
3. Double click on the **System** icon. This opens the "**System Properties**" window.
4. Click on the "**Device Manager**" tab. Double click on the item "**Ports (Com & LPT)**" located within the list of hardware.
5. Double click on any of the items labeled "**Quatech Multi- port(COM x)**" where *x* represents the logical COM port number. The items labeled "**Quatech Multi-port**" are the child devices of the QSP-200/300 parent device. Click the "**Resources**" tab at the top of the "**System Properties**" box.
6. The base I/O address and IRQ level displayed here is the base I/O address and IRQ level of the entire parent device. The resources cannot be modified here. For information on how to change these settings, go to the section labeled "Changing Configuration of the QSP-200/300".
7. Use the **Logical Com Port** name to access any of the particular serial ports on the QSP-200/300. This name is required by a Windows 95/98 application when accessing a particular port.

2.1.5 Windows 2000

1. Double click on the **My Computer** icon located on the Windows 2000 desktop. This opens a folder showing various drives, Control Panel, etc.
2. Double click on the **Control Panel** icon. This opens another folder with many different system utilities.
3. Double click on the **System** icon. This opens the "**System Properties**" window.
4. Click on the "**Hardware**" tab. Click on the '**Device Manager**'. Double click on the item "**Ports (Com & LPT)**" located within the list of hardware.
5. Double click on any of the items labeled "**Quatech PCMCIA Serial Port(COM x)**" where *x* represents the logical COM port number. The items labeled "**Quatech PCMCIA Serial Port**" are the child devices of the QSP-200/300 parent device. Right click on the chosen child device and choose "**Properties**".
6. The base I/O address and IRQ level displayed here is the base I/O address and IRQ level of the entire parent device. The resources cannot be modified here. For

information on how to change these settings, got to the section labeled "Changing Configuration of the QSP-200/300".

7. Use the **Logical Com Port** name to access any of the particular serial ports on the QSP-200/300. This name is required by a Windows 2000 application when accessing a particular port.

2.2 Changing Configuration of the QSP-200/300.

To change the hardware configuration of the QSP-200/300, follow the instructions below.

2.2.1 Windows 95/98/ME

1. Double click the **My Computer** icon located on the Windows 95/98/ME desktop.
2. Double click on the **Control Panel** icon.
3. Double click the **System** icon inside the **Control Panel** folder. This will open the **System Properties** box.
4. Click the **Device Manager** tab located along the top of the **System Properties** box.
5. Double click on the device group "**Quatech Comm Adapters**". The QSP-200/300 model name should appear in this list. If either the "**Quatech Comm Adapters**" group or the QSP-200/300 model number does not appear, contact Quatech Technical Support for further assistance.
6. Click on the QSP-200/300 item and then click on the button labeled "**Properties**".
7. Un-check the box "use automatic settings". This keeps Windows from changing the resource settings when the system is restarted.
8. Select a "Basic Configuration" from the list box. Each "Basic Configuration" is associated with a specific set of handshake and output driver options as listed in the table below (a functional description of these options are contained in the section **Hardware Information**).
9. If a change in I/O address and / or IRQ setting is required, select the resource to be modified (I/O or IRQ) and select "**Change Settings**". Make the desired changes and then click on "OK". A shutdown of the system may be required to allow the settings to change. If prompted for a shutdown, select the option which restarts Windows 95.
10. The QSP-200/300 will be automatically reconfigured to the desired settings.
11. The card is now ready for use.

2.2.2 Windows 2000

1. Double click the **My Computer** icon located on the Windows 2000 desktop.
2. Double click on the **Control Panel** icon.
3. Double click the **System** icon inside the **Control Panel** folder. This will open the **System Properties** box.
4. Click the **Device Manager** button located in the center of the **System Properties** box.
5. Double click on the device group "**Quatech Multiport Serial Devices**". The QSP-200/300 model name should appear in this list. If either the "**Quatech Comm**

Adapters" group or the QSP-200/300 model number does not appear, contact Quatech Technical Support for further assistance.

6. Click on the '**Quatech QSP-200/300 PCMCIA Four-Port RS-422/465 Serial Adapter**' item and then click on the button labeled "**Properties**".
7. Un-check the box "use automatic settings". This keeps Windows from changing the resource settings when the system is restarted.
8. Select a "Basic Configuration" from the list box. Each "Basic Configuration" is associated with a specific set of handshake and output driver options as listed in the table below (a functional description of these options are contained in the section **Hardware Information**).
9. If a change in I/O address and / or IRQ setting is required, select the resource to be modified (I/O or IRQ) and select "**Change Settings**". Make the desired changes and then click on "OK". A shutdown of the system may be required to allow the settings to change. If prompted for a shutdown, select the option which restarts Windows 95.
10. The QSP-200/300 will be automatically reconfigured to the desired settings.
11. The card is now ready for use.

Basic Configuration	I/O	IRQ	Handshake Mode	Output Mode
0000	any	any	loopback enabled	always enabled
0001	any	any	loopback enabled	RTS controlled
0002	any	any	loopback enabled	DTR controlled
0003	any	any	loopback disabled	always enabled
0004	any	any	loopback disabled	RTS controlled
0005	any	any	loopback disabled	DTR controlled
0006	any	any	loopback enabled	always enabled
0007	any	any	loopback enabled	RTS controlled
0008	any	any	loopback enabled	DTR controlled
0009	any	any	loopback disabled	always enabled
000A	any	any	loopback disabled	RTS controlled
000B	any	any	loopback disabled	DTR controlled

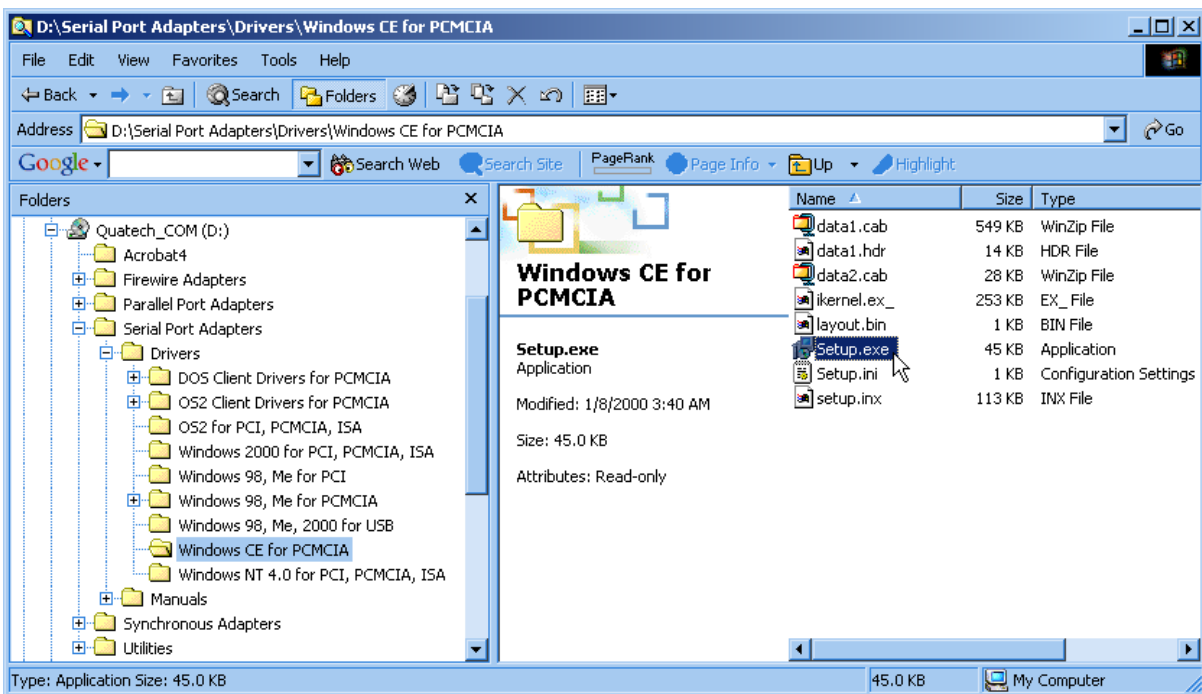
Figure 1. Windows 95/98 configuration options.

3 Windows CE

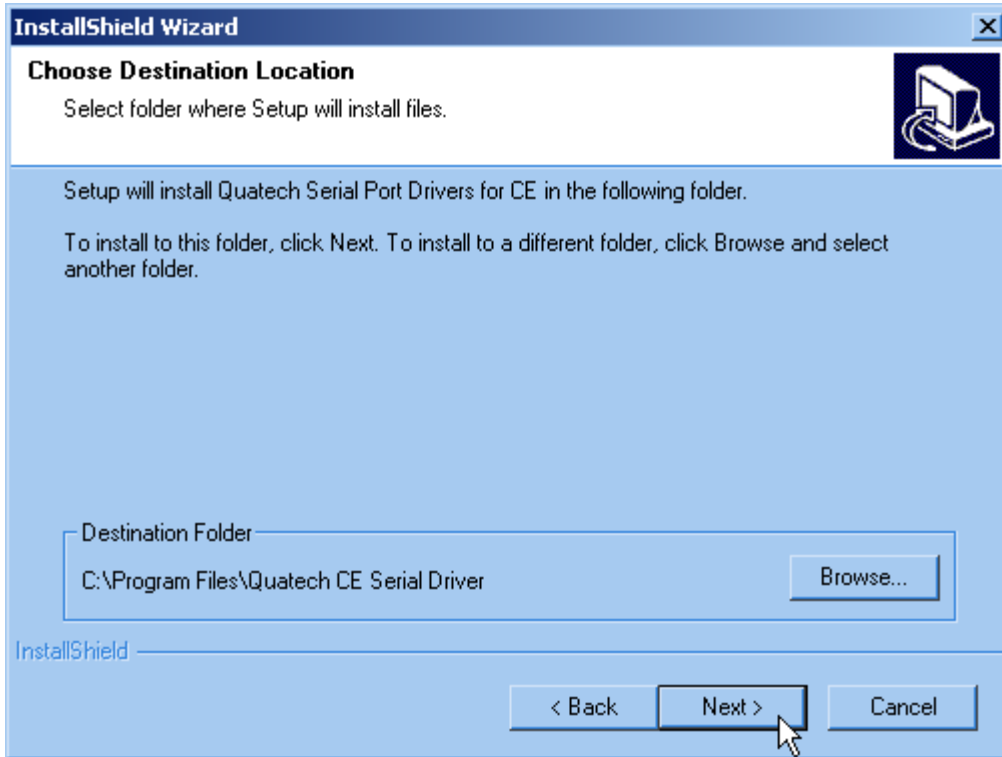
The Quatech PCMCIA Windows CD installation copies a multiple device-specific .cab files and the ini file to your desktop computer and launches the Application Manger (which resides on the user's desktop computer as a result of installing Active Sync) with the Application Manager .ini file as a parameter. This in turn will install the driver onto the Windows CE connected device or if not connected will install it on the next device connection to the desktop.

1.1 Installing Quatech PCMCIA Cards under Windows CE

1. Connect and establish communication to the device to the desk to using Active Sync (refer to Active Sync factory documentation)
2. Locate and run the setup.exe file located in the Windows CE for PCMCIA folder on the Quatech COM CD.

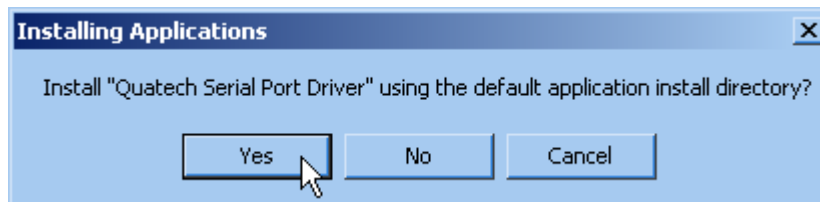
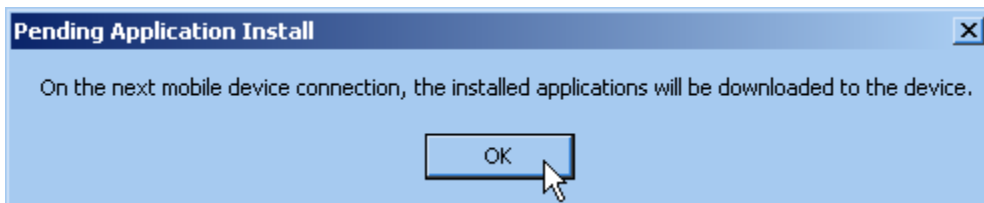


3. The setup program will copy the files to predetermined location, which can



be changed by the user. Click next to proceed.. Installation is now complete.

In the event that installation process took place with out having the Windows CE device connected to the computer and the install program will prompt the user that on the next on the next connection the device will complete the installation. Choose 'Yes' on the following window and you installation is now complete.



4 DOS / Windows 3.x Installation

Two configuration software programs are provided with the QSP-200/300: a Client Driver, QSP200CL.SYS, and a card Enabler, QSP200EN.EXE. Both of these programs are executed from DOS (before entering Windows) and allow operation of the QSP-200/300 in both the DOS and Windows 3.x environments. For optimal operation, however, the Client Driver is the preferred method of installation and configuration. The table below highlights the differences between these programs.

Client Driver (recommended)	Enabler (not recommended)
File name: QSP200CL.SYS	File name: QSP200EN.EXE
File type: DOS device driver	File type: DOS executable
Interfaces to PCMCIA Card and Socket Services software (PCMCIA host adapter independent)	Interfaces directly to Intel 82365SL and other PCIC compatible PCMCIA host adapters
Allows automatic configuration of QSP-200/300 adapters upon insertion (Hot Swapping)	Does not support automatic configuration of QSP-200/300 adapters upon insertion (Hot Swapping)
Requires PCMCIA Card and Socket Services software	Does not require PCMCIA Card and Socket Services software

Figure 2. Client Driver versus Enabler for DOS/Windows 3.x.

Card and Socket Services software is commercially available from several vendors for most desktop and laptop PCs. If you are unsure whether Card and Socket Services software is currently installed on your system, install the QSP-200/300 Client Driver as discussed in following section. When loaded, the Client Driver will display an error message if Card and Socket Services software is not detected.

4.1 QSP-200/300 Client Driver for DOS

In order to use the QSP-200/300 Client Driver, the system must be configured with Card and Socket Services software. Card and Socket Services software is not provided with the QSP-200/300.

IMPORTANT:

Some versions of Card and Socket Services dated before 1993 do not support general purpose I/O cards. If after careful installation of the Client Driver the QSP-200/300 does not configure or operate properly, an updated version of Card and Socket Services may be required.

4.1.1 Client Driver Installation

The following procedure is used to install the QSP-200/300 Client Driver:

1. Copy the file QSP200CL.SYS from the QSP-200/300 distribution CD onto the system's hard drive.
2. Using an ASCII text editor, open the system's CONFIG.SYS file located in the root directory of the boot drive.
3. Locate the line(s) in the CONFIG.SYS file where the Card and Socket Services software is installed.
4. **AFTER** the line(s) installing the Card and Socket Services software, add the following line to the CONFIG.SYS file:

DEVICE = *drive:\path*\QSP200CL.SYS

options

where *options* are the QSP-200/300 Client Driver command line options discussed on the following pages.

5. Save the CONFIG.SYS file and exit the text editor.
6. Insert the QSP-200/300 into one of the system's PCMCIA slots.

NOTE: Since the QSP-200/300 Client Driver supports "Hot Swapping", it is not necessary to have the QSP-200/300 installed when booting the system. By inserting the card before booting, however, the Client Driver will report the adapter configuration during the boot process thereby verifying the changes made to the CONFIG.SYS.

7. Reboot the system and note the message displayed when the QSP-200/300 Client Driver is loaded. If the Client Driver reports an "invalid command line option",

correct the entry in the CONFIG.SYS file and reboot the system again. If the Client Driver reports "Card and Socket Services not found", a version of Card and Socket Services must be installed on the system or the QSP-200/300 Enabler program must be used to configure the adapter. If the Client Driver reports the desired adapter configuration, the installation process is complete and the QSP-200/300 may be removed and / or inserted from the system as desired. On each insertion into the PCMCIA socket, the QSP-200/300 will be automatically reconfigured according to the command line options.

4.1.2 Command Line Options

The QSP-200/300 Client Driver accepts up to eight command line arguments from the user to determine the configuration of the QSP-200/300. If any arguments are provided, the Client Driver will attempt to configure any QSP-200/300s with the options specified in the order they are entered on the command line. Each argument must be enclosed in parenthesis and must be separated from other arguments by a space on the command line. Within each argument, any or all of the following parameters may be specified using a comma (no spaces) to separate each parameter:

Baddress specifies the base I/O address of the QSP-200/300 in hexadecimal and must reside on an even 32-byte (20H) boundary. If this option is omitted, a base address will be assigned by Card and Socket Services.

irq specifies the interrupt level (IRQ) of the QSP-200/300 in decimal. *irq* must be one of the following values: 3, 4, 5, 7, 9, 10, 11, 12, 14, 15, or 0 if no IRQ is desired. If this option is omitted, an interrupt level will be assigned by Card and Socket Services.

Ssocket specifies which PCMCIA socket the QSP-200/300 must be inserted into for this configuration argument to be used. *socket* must be in the range 0 - 15. If this option is omitted, the configuration argument will apply to QSP-200/300s inserted into any socket.

Omode specifies RS-422/485 output driver mode. The QSP-200/300's ports may be configured for either full duplex or half duplex operation with this option. If this option is omitted, the default setting is the RS-422/485 ports are configured for full duplex operation with the RS-422/485 output drivers always enabled. In half duplex mode, the RS-422/485 transmitter may be enabled and disabled via the RTS (request to send) or DTR (data terminal ready) signals. Both RTS and DTR are controlled through the Modem Control Register of the 16550. See the **Hardware Information** section for more information.

Option	Output Drivers
o0	Always Enabled

o1	DTR Controlled
o2	RTS Controlled

Figure 3. DOS Client Output Driver Options.

- H instructs the client driver to enable the RTS-CTS modem control handshake. When modem control handshaking is enabled, the 16C550 UART's RTS and CTS signals are connected to the RS-422/485 auxiliary channel (AuxOut and AuxIn). The auxiliary channel may then be used for handshaking between a DSP-200/300 RS-422/485 port and a peripheral device. When modem control handshaking is disabled, the RTS and CTS signals from the 16C550 UART are looped back to each other. If this option is omitted, the default setting is RTS-CTS modem control handshake disabled. See the **Hardware Information** section for more information.
- U instructs the Client Driver to disable the QSP-200/300's interrupt status register and enable the Scratchpad registers of the individual UARTs. This option is only required in very rare cases where an application program requires access to the UART's Scratchpad register. If this option is omitted, the QSP-200/300's interrupt status register is enabled and the UARTs' Scratchpad registers are disabled.

4.1.3 QSP-200/300 Client Driver Examples

Example 1

```
DEVICE = C:\QSP-200\QSP200CL.SYS
```

In example 1, no command line arguments are specified. The Client Driver will configure a QSP-200/300 inserted into any socket with a base address and IRQ assigned by Card and Socket Services. The output drivers will be configured for full duplex operation (always enabled), the RTS-CTS handshaking will be disabled (loopback mode), and the interrupt status register will be enabled.

Example 2

```
DEVICE = C:\QSP-200\QSP200CL.SYS (b300)
```

In example 2, a single command line argument is provided. The Client Driver will attempt to configure a QSP-200/300 inserted into any socket with a base address of 300H and an IRQ assigned by Card and Socket Services. If address 300H is unavailable, the QSP-200/300 will not be configured. If the Client Driver can successfully configure the card, the output drivers will be configured for full duplex operation (always enabled), the RTS-CTS handshaking will be disabled (loopback mode), and the interrupt status register will be enabled.

Example 3

```
DEVICE = C:\QSP-200\QSP200CL.SYS (s0,b300,i5)
```

In example 3, a single command line argument is provided. The Client Driver will attempt to configure a QSP-200/300 inserted into socket 0 with a base address of 300H and IRQ 5. If address 300H or IRQ 5 is unavailable, the card will not be configured. In addition, if a QSP-200/300 is inserted into any other socket, it will not be configured. If the Client Driver can successfully configure the card, the output drivers will be configured for full duplex operation (always enabled), the RTS-CTS handshaking will be disabled (loopback mode), and the interrupt status register will be enabled.

Example 4

```
DEVICE = C:\QSP-200\QSP200CL.SYS (i5,h,u,b300,o2)
```

In example 4, a single command line argument is provided. Because the parameter order is not significant, the Client Driver will attempt to configure a QSP-200/300 inserted into any socket with a base address of 300H and IRQ 5. If address 300H or IRQ 5 is unavailable, the card will not be configured. If the Client Driver can successfully configure the card, the output drivers will be configured for RTS controlled half duplex operation, the RTS-CTS handshaking will be enabled, and the interrupt status register will be disabled (i.e. the UARTs' Scratchpad registers will be enabled).

Example 5

```
DEVICE = C:\QSP-200\QSP200CL.SYS (b300,i5) (i10) ( )
```

In example 5, three command line arguments are provided. The Client Driver will first attempt to configure a QSP-200/300 inserted into any socket with a base address of 300H and IRQ 5. If address 300H or IRQ 5 is unavailable, the Client Driver will proceed to the second command line argument and attempt to configure the card with a base address assigned by Card and Socket Services and IRQ 10. If IRQ 10 is also unavailable, the Client Driver will proceed to the third command line argument and attempt to configure the card with a base address and an IRQ assigned by Card and Socket Services. If the Client Driver can successfully configure the card, the output drivers will be configured for full duplex operation (always enabled), the RTS-CTS handshaking will be disabled (loopback mode), and the interrupt status register will be enabled.

Example 6

```
DEVICE = C:\QSP-200\QSP200CL.SYS (b300,i5) ( ) (i10)
```

In example 6, the three command line arguments of example 5 have been rearranged. The Client Driver will first attempt to configure a QSP-200/300 inserted into any socket with a base address of 300H and IRQ 5. If address 300H or IRQ 5 is unavailable, the Client Driver will proceed to the second command line argument and attempt to configure the card with a base address and IRQ assigned by Card and Socket Services. Since the second command line argument includes all available address and IRQ resources, the third command line argument will never be reached by the Client Driver. It is the user's responsibility to place the command line arguments in a logical order.

Example 7

```
DEVICE = C:\QSP-200\QSP200CL.SYS (s0,b300,i5) (s1,b340,i10,o1)
```

The type of configuration shown in example 7 may be desirable in systems where more than one QSP-200/300 is to be installed. In this example, the Client Driver will attempt to configure a QSP-200/300 inserted into socket 0 with a base address of 300H and IRQ 5. If the card is inserted into socket 1, the Client Driver will attempt to configure it with base address 340H and IRQ 10. This allows the user to force the address and IRQ settings to be socket specific which may simplify cable connections and software development. As in the previous examples, however, if the requested address or interrupt resources are not available, the QSP-200/300 will not be configured.

4.1.4 Common Problems

Generic Client Drivers:

Many Card and Socket Services packages include a generic client driver (or "Super Client") which configures standard I/O devices. If one of these generic client drivers is installed, it may configure the QSP-200/300 causing the QSP-200/300 client driver to fail installation. In these cases, the user should do one of the following:

1. modify the operation of the generic client driver to disable the configuration of modem/serial port cards. Consult the Card and Socket Services documentation for availability and details of this feature.
2. place the QSP-200/300 client driver before the generic client driver in the CONFIG.SYS.

Available Resources:

One function of the Card and Socket Services software is to track which system resources (memory addresses, I/O addresses, IRQs, etc.) are available for assignment to inserted PCMCIA cards. Sometimes, however, the Card Services software assumes or incorrectly determines that a particular resource is used when it is actually available. Most Card and Socket Services generate a resource table in a file (typically in the form of an .INI file) which the user can modify to adjust the available system resources. Consult the Card and Socket Services documentation for availability and details of this feature.

Multiple Configuration Attempts:

Some Card and Socket Services have a setting which aborts the configuration process after a single configuration failure (such as a request for an unavailable resource). The user should change this setting to allow for multiple configuration attempts. Consult the Card and Socket Services documentation for availability and details of this feature.

Older Versions of Card and Socket Services:

Some versions of Card and Socket Services dated before 1993 do not support general purpose I/O cards. If after careful installation of the Client Driver the QSP-200/300 does not configure or operate properly, an updated version of Card and Socket Services may be required. Card and Socket Services software is available from Quatech Inc.

4.2 QSP-200/300 Enabler for DOS

For systems that are not operating PCMCIA Card and Socket Services software, the QSP-200/300 DOS Enabler may be used to enable and configure the adapter. This Enabler, QSP200EN.EXE, will operate on any DOS system using an Intel 82365SL or PCIC compatible PCMCIA host adapter including the Cirrus Logic CL-PD6710 / 6720, the VLSI VL82C146, and the Vadem VG-365 among others.

IMPORTANT:

In order to use the QSP-200/300 Enabler for DOS, the system **MUST NOT** be configured with Card and Socket Services software. If a Card and Socket Services software is installed, the QSP-200/300 Enabler may interfere with its operation and with the device(s) it controls.

The QSP-200/300 Enabler does not support automatic configuration of adapters upon insertion, more commonly referred to as "Hot Swapping". This means the adapter must be installed in one of the system's PCMCIA sockets before executing QSP200EN.EXE. If more than one adapter is installed in a system, the Enabler must be executed separately for each adapter. Furthermore, QSP200EN.EXE should be executed to release the resources used by the adapter before it is removed from the PCMCIA socket. Since PCMCIA adapters do not retain their configuration after removal, any adapter that is removed from the system must be reconfigured with the Enabler after reinserting it into a PCMCIA socket.

IMPORTANT:

The Enabler requires a region of high DOS memory when configuring a QSP-200/300. This region is 1000H bytes (4KB) long and by default begins at address D0000H (the default address may be changed using the "W" option). If a memory manager such as EMM386, QEMM, or 386Max is installed on the system, this region of DOS memory must be excluded from the memory manager's control. Consult the documentation provided with the memory manager software for instructions on how to exclude this memory region.

4.2.1 Command Line Options

To configure a QSP-200/300 in the system, the Enabler requires one command line argument from the user to determine the configuration of the card. This argument must be enclosed in parenthesis and within the argument, any or all of the following parameters may be specified using a comma (no spaces) to separate each parameter:

- Ssocket* specifies which PCMCIA socket the QSP-200/300 must be inserted into for this configuration argument to be used. *socket* must be in the range 0 - 15. This option is always required.
- Baddress* specifies the base I/O address of the QSP-200/300 in hexadecimal and must reside on an even 32-byte (20H) boundary. This option is required if the 'R' option is not used.
- Iirq* specifies the interrupt level (IRQ) of the QSP-200/300 in decimal. *irq* must be one of the following values: 3, 4, 5, 7, 9, 10, 11, 12, 14, 15, or 0 if no IRQ is desired. This option is required if the 'R' option is not used.
- Waddress* specifies the base address of the memory window required to configure the QSP-200/300. Set *address* = D0 for a memory window at segment D000, *address* = D8 for a memory window at segment D800, etc. Valid settings for *address* are C8, CC, D0, D4, D8, and DC. If this option is omitted, a memory window at segment D000 will be used.
- Omode* specifies RS-422/485 output driver mode. The QSP-200/300's ports may be configured for either full duplex or half duplex operation with this option. If this option is omitted, the default setting is the RS-422/485 ports are configured for full duplex operation with the RS-422/485 output drivers always enabled. In half duplex mode, the RS-422/485 transmitter may be enabled and disabled via the RTS (request to send) or DTR (data terminal ready) signals. Both RTS and DTR are controlled through the Modem Control Register of the 16550. See the **Hardware Information** section for more information.

Option	Output Drivers
o0	Always Enabled
o1	DTR Controlled
o2	RTS Controlled

Figure 4. DOS Enabler Output Driver Options.

- H instructs the Enabler to enable the RTS-CTS modem control handshake. When modem control handshaking is enabled, the 16C550 UART's RTS and CTS signals are connected to the RS-422/485 auxiliary channel (AuxOut and AuxIn). The auxiliary channel may then be used for handshaking between a QSP-200/300 RS-422/485 port and a peripheral device. When modem control handshaking is disabled, the RTS and CTS signals from the 16C550 UART are looped back to each

other. If this option is omitted, the default setting is RTS-CTS modem control handshake disabled. See the **Hardware Information** section for more information.

U instructs the Enabler to disable the QSP-200/300's interrupt status register and enable the Scratchpad registers of the individual UARTs. This option is only required in very rare cases where an application program requires access to the UART's Scratchpad register. If this option is omitted, the QSP-200/300's interrupt status register is enabled and the UARTs' Scratchpad registers are disabled.

Before removing a QSP-200/300 from its PCMCIA socket, the Enabler should be executed to free the system resources allocated when the card was installed. For this operation the Enabler provides an additional command line option:

R instructs the Enabler to release the resources previously allocated to the QSP-200/300. When the 'R' option is used, any settings specified by the 'B', 'I', 'U', and 'E' options are ignored. This option **must** be omitted when installing a QSP-200/300 into the system.

4.2.2 QSP-200/300 Enabler Examples

Example 1

QSP200EN.EXE

In example 1, no command line argument is specified. The Enabler will report an error and display the proper usage of the command.

Example 2

QSP200EN.EXE (s0,b300,i5)

In example 2, the Enabler will configure the QSP-200/300 in socket 0 with a base address of 300H and IRQ 5 using a configuration memory window at segment D000. The output drivers will be configured for full duplex operation (always enabled), the RTS-CTS handshaking will be disabled (loopback mode), and the interrupt status register will be enabled.

Example 3

QSP200EN.EXE (i10,u,b340,s1,o1,h)

In example 3, the Enabler will configure the QSP-200/300 in socket 1 with a base address of 340H and IRQ 10 using a configuration memory window at segment D000. The output drivers will be configured for DTR controlled half duplex operation, the RTS-CTS handshaking will be enabled, and the UARTs' Scratchpad registers will be enabled (i.e. the interrupt status register will be disabled). Note that the parameter order is not significant.

Example 4

QSP200EN.EXE (s0,b300,i3,wd8)

In example 4, the Enabler will configure the QSP-200/300 in socket 0 with a base address of 300H and IRQ 3 using a configuration memory window at segment D800. The output drivers will be configured for full duplex operation (always enabled), the RTS-CTS handshaking will be disabled (loopback mode), and the interrupt status register will be enabled.

Example 5

QSP200EN.EXE (s0,b300,i5,r)

In example 5, the Enabler will release the configuration used by the QSP-200/300 in socket 0 using a configuration memory window at segment D000. The base address and IRQ parameters are ignored and may be omitted.

Example 6

QSP200EN.EXE (s1,r,wcc)

In example 5, the Enabler will release the configuration used by the QSP-200/300 in socket 1 using a configuration memory window at segment CC00.

4.2.3 Common Problems

Memory Range Exclusion:

The Enabler requires a region of high DOS memory when configuring a QSP-200/300. This region is 1000H bytes (4KB) long and by default begins at address D0000H (the default address may be changed using the "W" option). If a memory manager such as EMM386, QEMM, or 386Max is installed on the system, this region of DOS memory must be excluded from the memory manager's control. Consult the documentation provided with the memory manager software for instructions on how to exclude this memory region.

Furthermore, some systems use the high memory area for BIOS shadowing to improve overall system performance. In order for the Enabler to operate, any BIOS shadowing must be disabled in the address range specified for the configuration window. BIOS shadowing can usually be disabled through the system's CMOS setup utility.

Contention with Other Devices:

Without Card and Socket Services support, the QSP-200/300 Enabler has no way to determine the resources in use by other devices in the system. It is the user's responsibility to guarantee that the parameters specified on the Enabler command line are available in the system and will not cause a conflict.

Socket Numbers:

The Enabler requires the QSP-200/300's socket number to be specified on the command line and the card must be inserted into the socket before the Enabler is invoked. Some vendors number their sockets from 1 to N while other vendors number their sockets from 0 to N-1. For the QSP-200/300 Enabler, the lowest socket number in the system is designated socket 0.

Card and Socket Services Software:

In order to use the QSP-200/300 Enabler for DOS, the system MUST NOT be configured with Card and Socket Services software. If a Card and Socket Services software is installed, the QSP-200/300 Enabler may interfere with its operation and with the device(s) it controls. For systems configured with Card and Socket Services, the QSP-200/300 Client Driver is the recommended method of configuration.

5 OS/2 Installation

In order to use the QSP-200/300 Client Driver for OS/2, the system must be configured as follows:

1. The system must be running OS/2 2.1 or later.
2. OS/2 PCMCIA Card and Socket Services support must be installed. If PCMCIA support was not selected when OS/2 was installed, it can be added using the Selective Install facility in the System Setup folder. On OS/2 2.1 and 2.11, Socket Services must be added separately. The necessary files can be found on Compuserve in the OS2SUPPORT forum and may be available elsewhere. These files are not available from Quatech Inc.
3. Quatech's OS/2 serial port device driver, "QCOM" version 2.01 or later, must be installed. The QSP-200/300 will not operate with the standard OS/2 serial port device drivers. Quatech Inc. can not guarantee the operation of the QSP-200/300 with any other third party device drivers for OS/2.
4. There must be at least 32 bytes of available I/O space and 1 available IRQ.

After the system has been configured to the above specifications, the QSP-200/300 Client Driver may be installed with the following procedure:

1. Copy the QSP200.SYS client driver file from the Quatech COM CD to any convenient directory on the hard disk.
2. Open the CONFIG.SYS file using any ASCII text editor.
3. Add the following line to the CONFIG.SYS file:

```
DEVICE =  
drive:\path\QSP200.SYS options
```

where *options* are the QSP-200/300 OS/2 Client Driver command line options discussed in the following sections.
4. Save the CONFIG.SYS file, exit the text editor, shutdown the system, and reboot to activate the changes.

5.1 Command Line Options

The QSP-200/300 Client Driver for OS/2 supports two methods of configuration: using "system assigned" resources and using "user assigned" resources. Both options provide full PCMCIA compliance and functionality (including "Hot-swapping") but each has some advantages and disadvantages as discussed in the following sections.

5.1.1 Configuring With "System Assigned" Resources

Allowing the OS/2 Plug-and-Play system to assign the hardware resources to the QSP-200/300 is the ideal choice when only OS/2 programs will access the serial ports. When configuring the hardware, the user simply specifies a list of COM port numbers. When a QSP-200/300 is inserted into a PCMCIA socket, the client driver will configure the card as a series of COM ports, starting with the lowest available port number in the list.

Configuring a QSP-200/300 with system assigned resources can be a problem, however, if DOS and/or Windows applications will be accessing the serial ports. This is because most DOS applications write directly to the communications hardware and the Windows' Control Panel also wants to know the hardware configuration of the serial ports. In these cases, the user may want to configure the QSP-200/300 with "user assigned" resources.

Example 1

```
DEVICE=C:\QSP-200\QSP200.SYS COM3
```

In example 1, the Client Driver will attempt to configure the QSP-200/300 as COM3 through COM6. If COM3, 4, 5, or 6 already exists in the system, the QSP-200/300 will not be configured. Furthermore, only one QSP-200/300 can be installed in this system.

Example 2

```
DEVICE=C:\QSP-200\QSP200.SYS COM7 COM3
```

In example 2, the Client Driver will attempt to configure the QSP-200/300 as COM3 through COM6. If COM3, 4, 5, or 6 already exists in the system, the Client Driver will attempt to configure the QSP-200/300 as COM7 through COM10. If COM7, 8, 9, or 10 already exist in the system, the QSP-200/300 will not be configured. Up to two QSP-200/300s can be installed in this system.

5.1.2 Configuring With "User Assigned" Resources

As mentioned in the previous section, allowing the OS/2 Plug-and-Play system to assign the hardware resources to the QSP-200/300 is ideal for OS/2 programs but can be a problem if DOS and/or Windows applications will be accessing the serial ports. This is because most DOS applications write directly to the communications hardware and the Windows' Control Panel also wants to know the hardware configuration of the serial ports. For this reason, the QSP-200/300 Client Driver allows the user to request specific hardware settings using a series of command line arguments of the form

(port,address,irq)

port	specifies the beginning COM port number
address	specifies the base I/O address of the QSP-200/300 in hexadecimal and must reside on an even 32-byte (20H) boundary.
irq	specifies the interrupt level (IRQ) of the QSP-200/300 in decimal. <i>irq</i> must be one of the following values: 3, 4, 5, 7, 9, 10, 11, 12, 14, or 15.

Each argument must be enclosed in parentheses and must be separated from other arguments by a space on the command line. Within each argument, the parameters must be separated using a comma (no spaces).

When a QSP-200/300 is inserted into a PCMCIA socket, the client driver will configure the card as a series of COM ports, starting with the lowest available port number in the list.

IMPORTANT:

If the user specified resources are in-use by other devices in the system, the QSP-200/300 will not be configured.

Example 1

```
DEVICE=C:\QSP-200\QSP200.SYS (3,100,5)
```

In example 1, the Client Driver will attempt to configure the QSP-200/300 as COM3 through COM6 using I/O addresses 100-11F hex and IRQ 5. If COM3, 4, 5, or 6 already exists, or if the I/O address or IRQ resources are already in use, the QSP-200/300 will not be configured. Furthermore, only one QSP-200/300 can be installed in this system.

Example 2

```
DEVICE=C:\QSP-200\QSP200.SYS (7,120,15) (3,300,4)
```

In example 2, the Client Driver will attempt to configure the QSP-200/300 as COM3 through COM6 using I/O address 300-31F hex and IRQ 4. If COM3, 4, 5, or 6 already exists, or if the I/O address or IRQ resources are already in use, the Client Driver will attempt to configure the QSP-200/300 as COM7 through COM10 using I/O address 120-13F hex and IRQ 15. If COM7, 8, 9, or 10 already exists or if the I/O address or IRQ resources are already in use, the QSP-200/300 will not be configured. Up to two QSP-200/300s can be installed in this system.

5.1.3 Advanced Configuration Topics

For some applications, it may be desirable to specify the resources for one QSP-200/300 while allowing the OS/2 Plug-and-Play system to assign the hardware resources for any additional cards. This can be accomplished by mixing the configuration methods on the QSP-200/300 Client Driver command line

```
DEVICE=C:\QSP-200\QSP200.SYS (3,100,5) COM7
```

It is important to remember that when a QSP-200/300 is inserted into a PCMCIA socket, the client driver will configure the card as a series of COM ports, starting with the lowest available port number in the list.

Another common application requirement is to have a QSP-200/300 inserted into socket 1 be configured as COM3 through COM6 while a QSP-200/300 inserted into socket 2 be configured as COM7 through COM10. This type of configuration is supported by appending a "=Sx" parameter **after** any command line argument.

```
DEVICE=C:\QSP-200\QSP200.SYS COM3=S1 COM7=S2  
DEVICE=C:\QSP-200\QSP200.SYS (3,100,4)=S1 (7,300,3)=S2
```

5.2 Monitoring The Status Of PCMCIA Cards

OS/2 Warp provides a utility called "Plug and Play for PCMCIA" that can be used to monitor the status of each PCMCIA socket. In OS/2 2.1, this utility is called "Configuration Manager". When a QSP-200/300 is inserted, the Card Type for the appropriate socket will display "Multi-Function". If the card is successfully configured, the Card Status will display "Ready". If the card cannot be configured, the Card Status will be "Not Ready". You can view the resources claimed by a configured card by double-clicking on that card's line in the window.

5.3 Common Problems

Invalid I/O Address When Using OS/2 2.1:

PCMCIA Card Services for OS/2 2.1 sometimes fails to supply a valid I/O address when using "system assigned" resources. Use the "Configuration Manager" program to examine the I/O address range assigned to the QSP-200/300. If this range does not begin on an even 32 byte (20H) boundary, the QSP-200/300 will have to be installed using "user assigned" resources to force a valid configuration.

There have not been any reports of this problem with OS/2 Warp.

Resources Not Available:

When using "user assigned" resources, it is the user's responsibility to ensure the I/O address and IRQ resources are available. For OS/2 Warp users, the RMVIEW utility may be useful in finding resource conflicts. Type "rmview /?" at an OS/2 command prompt for details.

When using "system assigned" resources, if the user knows the port number is available then the system may not have sufficient resources available to configure the QSP-200/300. Again, the RMVIEW utility provided with OS/2 Warp may be useful in determining the problem.

Regardless of the configuration method, each command line argument specifies the first of four COM ports for the QSP-200/300. If any of these COM ports are already installed, the Client Driver will not load.

Parameter Overlapping:

When installing the QSP-200/300, each command line argument specifies the first of four COM ports. If these arguments overlap, the Client Driver will not load. For example, it is illegal to specify QSP200.SYS COM3 COM4 because the first argument requests COM3 - COM6 and the second argument specifies COM4 - COM7.

Insufficient Number Of Command Line Arguments:

The QSP-200/300 command line must contain at least one command line argument for each QSP-200/300 to be installed.

6 Hardware Information

6.1 Port Addressing

The QSP-200/300's four asynchronous serial ports are implemented using 4 standard 16C550 UARTs. Each of these UARTs requires 8 bytes of I/O space and when enabled which requires the QSP-200/300 to be located on an even 32-byte (20H) boundary (e.g. 300H, 320H, 340H, etc.).

QSP-200/300 channel	Address assignment
Channel A	Base Address + 0
Channel B	Base Address + 8
Channel C	Base Address + 16
Channel D	Base Address + 24

6.2 Scratchpad / Interrupt Status Register

Each 16C550 UART contains 8 I/O registers. The last of these registers, located at (Base address + 7), is referred to as the 'Scratchpad Register' and provides no functionality to the UART. In place of this Scratchpad Register, the QSP-200/300 implements an interrupt status register which can be accessed at (Base address + 7) of any UART. The purpose of the interrupt status register is to give the software programmer an easy way to inspect the interrupt state of the entire QSP-200/300 with a single input operation. The format of the interrupt status register is shown below:

D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	0	Intr D	Intr C	Intr B	Intr A

When one or more UARTs have interrupts pending, the associated bit(s) in the interrupt status register are set to logic 1. When all the pending interrupts have been serviced for a specific UART, its interrupt status bit will be cleared to logic 0 automatically. When all the pending interrupts from all UARTs have been serviced, the entire interrupt status register will return logic 0. The application program should not exit its interrupt service routine until all pending interrupts from all channels have been serviced (interrupt status register = 0) or no additional interrupts will be received.

If an application requires the UARTs' Scratchpad Registers, the interrupt status register can be disabled. Disabling the interrupt status register is supported by the QSP-200/300 configuration software, which is operating system dependent. Refer to the relevant operating system installation section for specific usage of this feature.

6.3 Auxiliary Channel Configuration

An auxiliary channel is provided which allows for handshaking between a QSP-200/300 RS-422/485 port and a peripheral device. This auxiliary channel may be configured in one of two ways:

- RTS-CTS handshake enabled.
- handshaking is disabled.

All ports must be configured in the same manner.

6.3.1 Auxiliary Channel: RTS-CTS Handshaking

The RTS-CTS handshake may be enabled so that RTS (Request To Send) is the auxiliary output signal on AuxOut+ and AuxOut- (pins 1 and 6 of the D9 female connector). Similarly, CTS (Clear To Send) is the auxiliary input signal on AuxIn+ and AuxIn- (pins 5 and 9 of the D9 female connector). This configuration is shown below.

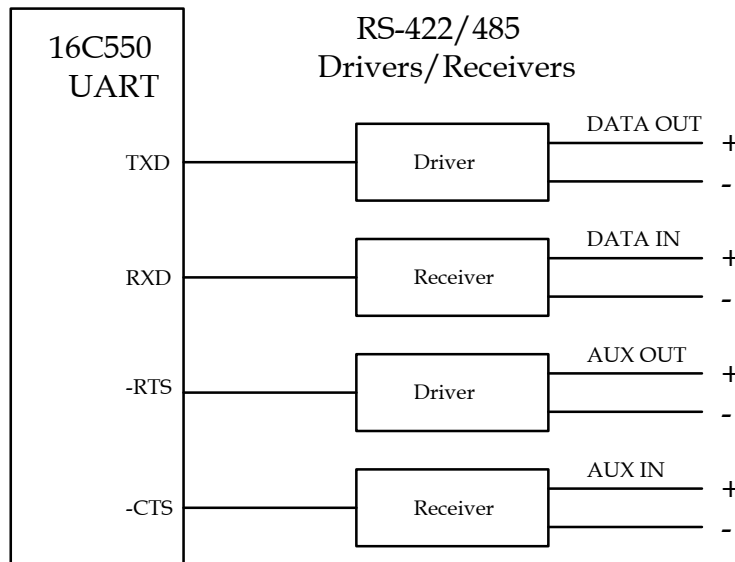


Figure 5. Auxiliary Channel RTS-CTS Handshaking.

6.3.2 Auxiliary Channel: Handshaking Disabled

The QSP-200/300 ports may be configured so that the RTS-CTS handshake is disabled. This is the default configuration. In this configuration, RTS and CTS from the 16C550 UART will be looped back to each other. In addition, the auxiliary output and input signals will be looped back to each other. This configuration is shown below:

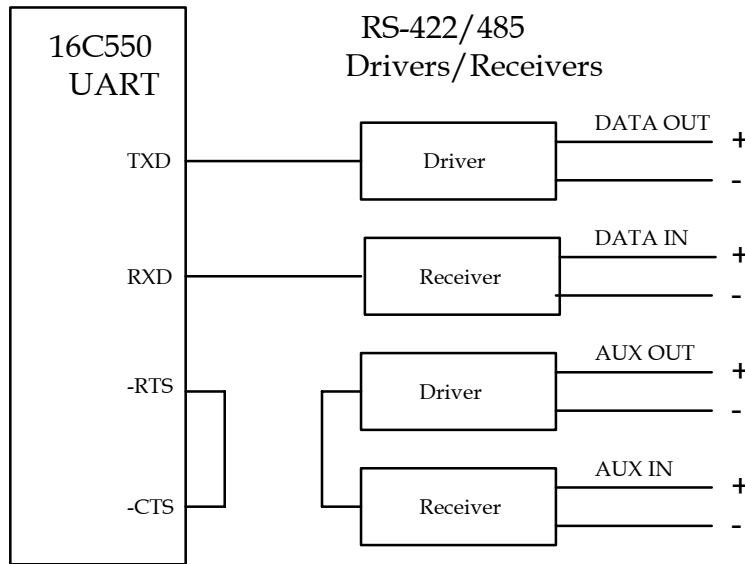
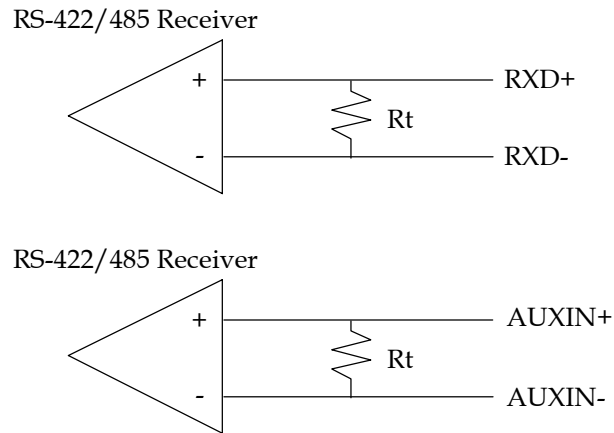


Figure 6. Auxiliary Channel Handshaking Disabled

6.4 Termination Resistors

No termination resistors are provided on the QSP-200/300 ports. Both output and input signals are connected only to the external connector. Any termination which is required must be added externally.



Recommended Termination Resistor Values

RS-422	RS-485
100 ohm 1/2W resistor	60 ohms total resistance (120 ohms at each end)

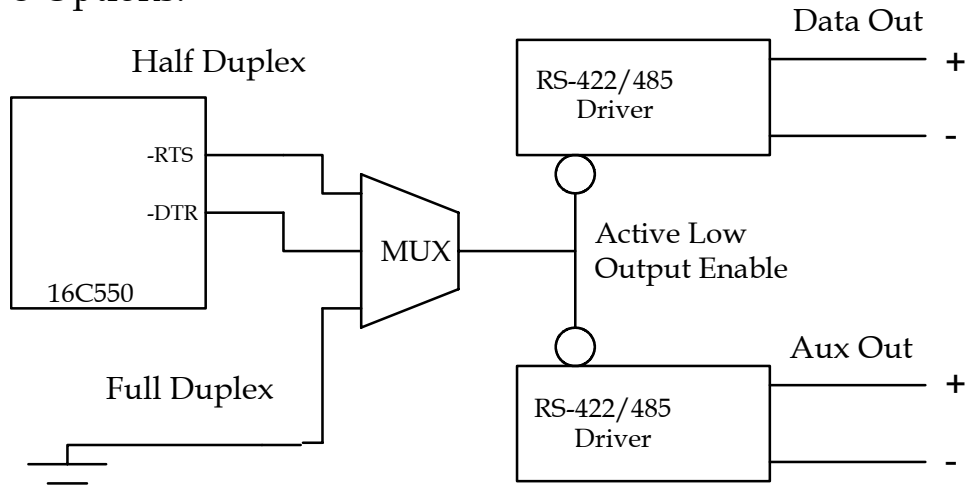
Figure 7. RS-422/485 Termination

6.5 2-Wire Operation

The QSP-200/300's ports may be configured for either full duplex or half duplex operation. By default, the RS-422/485 ports are configured for full duplex operation with the RS-422/485 output drivers always enabled.

In half duplex mode, the RS-422/485 transmitter may be enabled and disabled via the RTS (request to send) or DTR (data terminal ready) signals. Both RTS and DTR are controlled through the Modem Control Register of the 16550.

3 Options:



NOTE: One of these three options must be selected via software configuration. Full duplex operation is the default mode.

Figure 8. RS-422/485 Driver Enable Options

If RTS is selected as the signal to enable the output drivers, setting 'bit 1' of the Modem Control Register (to logic '1') will enable the output drivers and clearing 'bit 1' of the Modem Control Register (to logic '0') will force the outputs into a high impedance state.

Similarly, if DTR is chosen as the signal to enable the output drivers setting 'bit 0' of the Modem Control Register (to logic '1') will enable the output drivers and clearing 'bit 0' of the Modem Control Register (to logic '0') will force the outputs into a high impedance state.

Selection of half duplex mode operation is dependent upon the configuration software and/or the operating system used. Each of these, however, ultimately control the half duplex mode by accessing the PCMCIA Configuration Register on the QSP-200/300.

CAUTION:

When operating in half duplex mode, the transmitter output drivers **must be** disabled before receiving and information. Failure to do so will result in two output drivers being connected together which may cause damage to the adapter, the computer, and/or the peripheral equipment.

7 External Connections

An adapter cable is included with the QSP-200/300 to convert the PCMCIA output connector into 4 standard D-9 female RS-232 connectors as shown in the figure below.

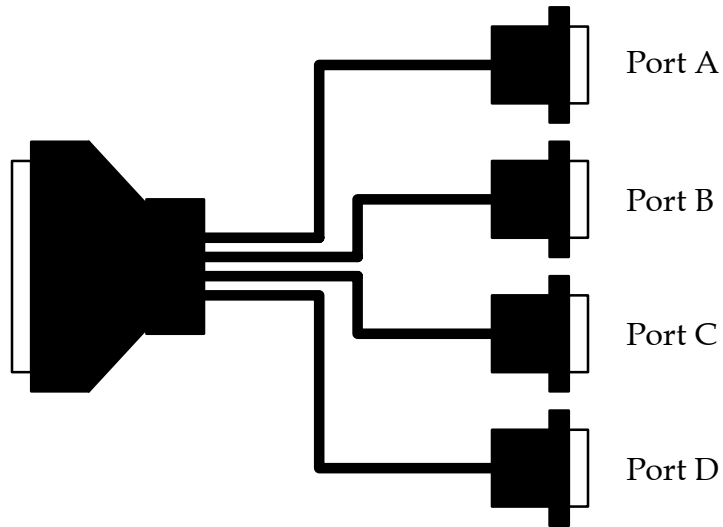


Figure 10. QSP-200/300 adapter cable to standard female D-9 connectors.

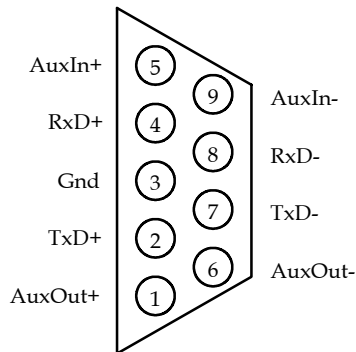


Figure 11. D-9 female RS-422/485 connector signal assignment.

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